

CLAIMS

1. A disturbing signal detecting device in which a plurality of carriers having frequencies orthogonal to each other in a transmission band are modulated with allocated information signal, the device receives an OFDM transmission signal with a known pilot signal periodically inserted for the plurality of carriers modulated with the information signal, and detects a disturbing signal included in the signal received, comprising:

an IFFT computing unit for performing an IFFT computation for a transmission line characteristic calculated from the pilot signal;

a threshold processing part that compares a time-base signal obtained as a result of an IFFT computation by the IFFT computing unit, with a threshold, and if the time-base signal exceeds the threshold, substitutes zero for a value of the signal;

an FFT computing unit that performs an FFT computation for the signal processed by the threshold processing part and converts to a frequency-base signal; and

an interference detector that interpolates timewise and frequencywise the frequency-base signal obtained from the FFT computing unit, and calculates a disturbing signal added to an OFDM signal band.

2. The disturbing signal detecting device as claimed in claim 1, further comprising:

a windowing part that multiplies the transmission line characteristic calculated from the pilot signal, by a window function; and

an inverse windowing part that multiplies the frequency-base signal obtained from the FFT computing unit, by an inverse number of the window function multiplied in the windowing part.

3. The disturbing signal detecting device as claimed in one of
5 claim 1 and claim 2, further comprising:

a signal quality calculating part that calculates an average value of information on the frequencywise disturbing signal obtained from the interference detector, as a level of a disturbing signal for an entire signal band.

10 4. A disturbing signal detecting device in which a plurality of carriers having frequencies orthogonal to each other in a transmission band are modulated with allocated information signal, the device receives an OFDM transmission signal with a known pilot signal periodically inserted for the plurality of carriers modulated with the
15 information signal, and detects a disturbing signal included in the signal received, comprising:

an IFFT computing unit for performing an IFFT computation for a transmission line characteristic calculated from the pilot signal;

a threshold processing part that compares a time-base signal
20 obtained as a result of an IFFT computation by the IFFT computing unit, with a threshold, and if the time-base signal is smaller than the threshold, substitutes zero for a value of the signal;

an FFT computing unit that performs an FFT computation for the signal processed by the threshold processing part and converts to a
25 frequency-base signal;

a subtraction processing part that subtracts the frequency-base signal obtained from the FFT computing unit, from a signal of the

transmission line characteristic calculated from the pilot signal; and
an interference detector that interpolates timewise and
frequencywise the frequency-base signal obtained from the subtraction
processing part, and calculates a disturbing signal added to an OFDM
5 signal band.

5. The disturbing signal detecting device as claimed in claim 4,
further comprising:

a windowing part that multiplies the transmission line
characteristic calculated from the pilot signal, by a window function;
10 and

an inverse windowing part that multiplies the frequency-base
signal obtained from the FFT computing unit, by an inverse number of
the window function multiplied in the windowing part.

6. The disturbing signal detecting device as claimed in one of
15 claim 4 and claim 5, further comprising:

a signal quality calculating part that calculates an average value
of information on the frequencywise disturbing signal obtained from
the interference detector, as a level of a disturbing signal for an entire
band of a signal received.

20 7. A disturbing signal detecting device in which a plurality of
carriers having frequencies orthogonal to each other in a transmission
band are modulated with allocated information signal, the device
receives an OFDM transmission signal with a known pilot signal
periodically inserted for the plurality of carriers modulated with the
25 information signal, and detects a disturbing signal included in the
signal received, comprising:

a transmission line estimating part that obtains a transmission

line characteristic calculated from pilot signals, and interpolates timewise and frequencywise the transmission line characteristic calculated from the pilot signal, based on an arrangement rule of the pilot signal;

5 an IFFT computing unit that performs an IFFT computation for a signal indicating a transmission line characteristic of all OFDM carriers obtained from the transmission line estimating part;

 a threshold processing part that compares a time-base signal obtained as a result of an IFFT computation by the IFFT computing
10 unit, with a threshold, and if the time-base signal exceeds the threshold, substitutes zero for a value of the signal; and

 an FFT computing unit that performs an FFT computation for the signal processed by the threshold processing part and converts to a frequency-base signal.

15 8. The disturbing signal detecting device as claimed in claim 7, further comprising:

 a windowing part that multiplies the transmission line characteristic derived by the transmission line estimating part, by a window function; and

20 an inverse windowing part that multiplies the frequency-base signal obtained from the FFT computing unit, by an inverse number of the window function multiplied in the windowing part.

 9. The disturbing signal detecting device as claimed in one of claim 7 and claim 8, further comprising:

25 a signal quality calculating part that calculates an average value of information on the frequencywise disturbing signal obtained from the FFT computing unit, as a level of a disturbing signal for an entire

band of a signal received.

10. A disturbing signal detecting device in which a plurality of carriers having frequencies orthogonal to each other in a transmission band are modulated with allocated information signal, the device
5 receives an OFDM transmission signal with a known pilot signal periodically inserted for the plurality of carriers modulated with the information signal, and detects a disturbing signal included in the signal received, comprising:

a transmission line estimating part that obtains a transmission
10 line characteristic calculated from pilot signals, and interpolates timewise and frequencywise the transmission line characteristic calculated from the pilot signal, based on an arrangement rule of the pilot signal;

an IFFT computing unit that performs an IFFT computation for a
15 signal indicating a transmission line characteristic of all OFDM carriers obtained from the transmission line estimating part;

a threshold processing part that compares a time-base signal obtained as a result of an IFFT computation by the IFFT computing unit, with a threshold, and if the time-base signal is smaller than the
20 threshold, substitutes zero for a value of the signal; and

an FFT computing unit that performs an FFT computation for the signal processed by the threshold processing part and converts to a frequency-base signal; and

a subtraction processing part that subtracts the frequency-base
25 signal obtained from the FFT computing unit, from a signal transmission line characteristic calculated from pilot signals.

11. The disturbing signal detecting device as claimed in claim 10,

further comprising:

a windowing part that multiplies the transmission line characteristic derived by the transmission line estimating part, by a window function; and

5 an inverse windowing part that multiplies the frequency-base signal obtained from the FFT computing unit, by an inverse number of the window function multiplied in the windowing part.

12. The disturbing signal detecting device as claimed in one of claim 10 and claim 11, further comprising:

10 a signal quality calculating part that calculates an average value of information on the frequencywise disturbing signal obtained from the subtraction processing part, as a level of a disturbing signal for an entire band of a signal received.

13. An OFDM receiver that includes:

15 a received signal FFT computing unit that converts a received signal to a frequency-domain signal;

a pilot extractor that extracts a pilot signal from the frequency-domain signal and calculates a transmission line characteristic of a carrier in which the pilot signal existed;

20 a transmission line characteristic estimating part that interpolates timewise and frequencywise the transmission line characteristic calculated by the pilot extractor, and calculates an estimate for a transmission line characteristic of all OFDM carriers;

a divider that divides the output from the received signal FFT
25 computing unit, by the estimate for the transmission line characteristic;

a soft decision part that calculates likelihood based on a distance

from a transmitted signal point to a received signal point; and

an error correcting part that performs error correction using the likelihood, further comprising the disturbing signal detecting device as claimed in one of claim 1 and claim 4, wherein the OFDM receiver
5 corrects the likelihood according to the disturbing signal calculated by the interference detector included in the disturbing signal detecting device.

14. An OFDM receiver that includes:

a received signal FFT computing unit that converts a received
10 signal to a frequency-domain signal;

a pilot extractor that extracts a pilot signal from the frequency-domain signal and calculates a transmission line characteristic of a carrier in which the pilot signal existed;

a transmission line characteristic estimating part that
15 interpolates timewise and frequencywise the transmission line characteristic calculated by the pilot extractor, and calculates an estimate for a transmission line characteristic of all OFDM carriers;

a divider that divides the output from the received signal FFT computing unit, by the estimate for the transmission line
20 characteristic;

a soft decision part that calculates likelihood based on a distance from a transmitted signal point to a received signal point; and

an error correcting part that performs error correction using the likelihood, further comprising the disturbing signal detecting device as
25 claimed in claim 7, wherein the OFDM receiver corrects the likelihood according to the disturbing signal calculated by the FFT computing unit included in the disturbing signal detecting device.

15. An OFDM receiver that includes:

a received signal FFT computing unit that converts a received signal to a frequency-domain signal;

5 a pilot extractor that extracts a pilot signal from the frequency-domain signal and calculates a transmission line characteristic of a carrier in which the pilot signal existed;

a transmission line characteristic estimating part that interpolates timewise and frequencywise the transmission line characteristic calculated by the pilot extractor, and calculates an
10 estimate for a transmission line characteristic of all OFDM carriers;

a divider that divides an output from the received signal FFT computing unit, by the estimate for the transmission line characteristic;

a soft decision part that calculates likelihood based on a distance
15 from a transmitted signal point to a received signal point; and

an error correcting part that performs error correction using the likelihood, further comprising the disturbing signal detecting device as claimed in claim 10, wherein the OFDM receiver corrects the likelihood according to the disturbing signal calculated by the subtraction
20 processing part included in the disturbing signal detecting device.